

Antarctic Ice-Shelf Front Dynamics from ICESat

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Time variable elevation profiles from ICESat Laser Altimetry over the period 2003-2009 provide a means to quantitatively detect and track topographic features on polar ice surfaces. The results of this study provide a measure of the horizontal motion of ice-shelf fronts. We examine the time histories of elevation profiles crossing the ice fronts of the Ross, Ronne, Filchner, Riiser-Larson and Fimbul shelves. This provides a basis for estimating dynamics in two dimensions, i.e. in elevation and horizontally in the along-track direction. Ice front velocities, corrected for ground-track intersection angle, range from nearly static to 1.1 km/yr. In many examples, a decrease in elevation up to 1 m/yr near the shelf front is also detectable. Examples of tabular calving along shelf fronts are seen in some elevation profiles and are confirmed by corresponding MODIS imagery.